DRAFT Tennessee Valley Authority
Integrated Resource Plan Stakeholder Review Group
Working Session
MEETING MINUTES
December 15, 2010
Knoxville, TN

Members Present:
Randy McAdams, Facilitator, Scott Madden
Richard Holland, Packaging Corporation of America
David Reister, Environmental Stakeholder
Jack Simmons, Tennessee Valley Public Power Association
Stephen Smith, Southern Alliance for Clean Energy

Attending by Webinar:
Louise Gorenflo, Sierra Club
Tom King, Oak Ridge National Laboratory
Brian Paddock, Guest, Sierra Club

Members Absent:
Lance Brown, Partnership for Affordable Clean Energy
Ryan Gooch, State of Tennessee
George Kitchens, Joe Wheeler Electric Membership Corporation
Hank List, Commonwealth of Kentucky
David McKinney, Tennessee Wildlife Resource Agency
Jan Simek, University of Tennessee
Patrick Sullivan, Office of Governor Haley Barbour
Lloyd Webb, Tennessee Valley Industrial Committee
Deb Woolley, Tennessee Chamber of Commerce and Industry

Guests:
Steve Adams, Tennessee Valley Public Power Association
Sam Gomberg, Southern Alliance for Clean Energy
Josh Veazey, Partnership for Affordable Clean Energy

TVA: Gary Brinkworth, Larry Cole, Ed Colston, Jill Glenn, Mike Ingram, Randy Johnson, Bob Mango, Chuck Nicholson, Jeff Parsley, Dan Pratt, Helen Rucker, Greg Signer, Mary Carlie Vaughn, Van Wardlaw, Beth Yetter, Michael Anckner, Steve Gilbert

I. Introduction

Randy McAdams welcomed the SRG. He reminded the SRG that the last session, held on November 18, 2010 in Murfreesboro, was a workshop which focused on refreshing assumptions in preparation for the final IRP. McAdams went over the purpose of the SRG and reminded the SRG that today's meeting is a working session. At this point, the SRG and IRP project team are finishing up the "second lap" of the analysis.

McAdams introduced Michael Anckner and Helen Rucker who will be going over the Natural Resource Plan (NRP) as requested by the SRG in a prior session.

II. Review of the NRP:

Helen Rucker, Senior Manager, Business Support and Project Management
Michael Anckner, Scott Madden

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While the IRP focuses on TVA's power portfolio, the NRP will provide the strategic framework to guide future decisions by TVA in the specific areas of water resources, biological and cultural resources, recreation and reservoir planning. Both are 20 year plans and will incorporate scenario planning.

- Target date for NRP draft is Feb. to Mar. 2011; Target to complete final is summer 2011.
- NRP will cover all TVA managed lands (~293,000 mi across the Valley); this doesn't include transmission right of ways.
- This is a new plan for TVA and is not a Board mandated requirement – originally started out as part of the IRP, but was separated. There are very few, if any, utilities that do a separate NRP assessment.
- The scenario planning process used in the NRP is not as model intensive as with the IRP; started with IRP scenarios and narrowed to four.
    - Three NRP strategies: (1) resource conservation (2) recreation focused (3) mix of strategies one and two.
- The review group for the NRP is the Regional Resource Stewardship Council (RRSC)

Assessments that aid in the development of the NRP include:

- Land conditions assessment: involves going into the field and comprehensively assessing: how is this land being used/abused and how could it cause impacts to land/species in the area; prioritized into three categories: public use and safety; compliance preservation; asset preservation
    - Last year assessed 14,000 acres
- Recreation assessment – one aspect of this is the work being done within TVA technology innovation on TVA Clean Campground (have smart grid, wind turbine, solar panel, battery storage system includes EE)
- Have the TVA Clean Marina Initiative which aids in water quality management

Questions on status of Sustainability Plan – was posted to the TVA external site; issued on June 2, 2010 in response to Executive Order implemented by President Obama.
http://www.tva.gov/abouttva/TVA_Strategic_Sustainability_Performance_Plan_2011.pdf

Questions and Comments from Stakeholders:

- Within context of reservoir management plans, what amount of TVA managed public lands would fall outside of the reservoir management plans?
    - (TVA response) Land management plans only apply to reservoir properties; does not apply to power lands; right of ways are addressed in a separate document
- Would like more information on the Sustainability Plan (see above)
- NRP economic benefit analysis - request for more information

III. Update on Public Comments:
Chuck Nicholson, IRP NEPA project manager

The IRP comment period has been closed for about a month and most of the comments have been processed. There are about 500 total comments; two-thirds of these are in pre-printed postcard form. Comments have been submitted by various organizations, industries, alliances, business groups, individuals, etc.
Themes of comments:

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- A lot of comments commend TVA on the initiative to idle coal-fired plants; a few comments expressed concern on losing system reliability from certain idling decisions and concern in terms of whether load pockets might be created within the transmission network; also, localized concern around idling decisions (local economic/ employment type impacts)
- Managing environmental impacts from biomass generation
- Opposition to the generation from nuclear energy (concerns over cost, waste management); also had comments supporting generation from nuclear energy (economic development, clean energy, baseload power)
- EEDR – comments regarding how the portfolios were developed and how the EEDR portfolios were managed in the portfolio development process. Also comments regarding TVA's strategy for implementing EEDR programs through distributors.
- Energy storage – many comments stating it should be increased
- Natural gas – many comments promoting its use (most from NG industry); critiques on long-term NG price forecast – say gas is not going to increase as much in price as projected in the model.
    - Other comments stating concerns of fracking especially concerning what would happen to supply if strict regulations regarding fracking emerge.

Processing comments: Comments come from various sources (email, letters, etc.); each comment/letter is entered into a database and then each comment is read carefully to identify and break down the comment into comment statements. Comment statements are then assigned to individuals to answer.

IV. Part 1 – Preliminary Results from Ongoing Analysis:
Gary Brinkworth, Senior Manager, Generation and Portfolio Optimization

At this point, in the process of developing a recommended strategy to present to the TVA Board.

- In preparation for the final IRP, conducting a bounded optimization; not recommending a particular portfolio, but recommending a direction for TVA (strategy)
- The bounded optimization analysis is built on the information that was discussed in the November workshop. The portfolios are initially defined by locked-in levels of coal-fired idling levels which are the first component put into the model. These idling levels are locked in because the model cannot "optimize" idling levels.
- Then, the model is able to "see" and "choose" different iterations/levels of EEDR and renewables based on the specific coal-fired idling amounts while still achieving a least-cost plan. Then, further asset additions are included based on what the model chooses (after taking into account the idling amounts and amounts of EEDR and renewables). This analysis is still bound by the debt ceiling.
    - The boundaries of this analysis came from the three planning strategies that were retained in the Draft IRP (Strategies B, C, E).
    - The Board will see an example/illustrative portfolio in order to understand "if we implemented today, this is what it would look like."
- Changes in assumptions from draft to final:
    - Energy storage – has been retained in all cases
    - Nuclear and coal constraints - are the same as in the draft

  - Market purchase/transmission limits - are the same as in the draft (limits on annual market purchases)
  - Allow the model to choose additions based on locked in assumptions (the only assumption that a defined model input is locked in is coal-fired idling amounts)
  - Two of the wind contracts are already delivering power. The rest of the contracts will be brought in - still assessing impact
  - Not capping EE in 2020 – reporting what the target is (represented by a snapshot at 2020)
  - Within each scenario, testing all coal-fired idling levels and allowing the model to pick any combination of resource additions; then, look @ those bounded optimization results and see if there is a trend that we can extract from results to help guide us to a recommended strategy.
  - Load requirements/demand for 2020 have been updated (Scenario 8)
- When it comes time to assess results, will use scorecard evaluation
  - To create boundaries of analysis, will use ranking metrics and apply to optimization results to select preferred coal-fired capacity idling level
    - Trying to identify the amount of idled capacity that is the best performer in the three strategies; once the optimal level has been identified, then will be able to lock down that level and identify what other attributes seem to frequently show up paired with that level of idled coal-fired capacity; these choices will become the attributes of the Recommended Planning Strategy
  - A lot of the results are an outcome of the outlook on commodity prices, construction cost prices, energy efficiency's deployment capability, extent of technology advancements, view on system reliability, etc. These are all individual pieces of the puzzle which will help to inform decision makers.
  - Has been ongoing dialogue with the Board – There will be multiple Board briefings before final IRP is presented to Board for approval in April 2011.

Questions and Comments from Stakeholders:

- Seems that the final IRP will be best utilized in conjunction with Draft IRP. Need to message that final is an updated/improved version of Draft.

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V. Part 2 - Preliminary Results of Ongoing Analysis:
Gary Brinkworth

Showed resource addition schedules for the 12 portfolios (3 scenarios w/ 4 coal-fired layup portfolios for final IRP)

- Results:
  - Scenario 1 (aggressive growth assumption) – has the most resource additions
  - Examining implications of changing some of the fundamental assumptions in the portfolio – trying to understand the choices the model is making and trying to see if we can understand/explain these choices and identify trends.

  - Pumped storage is not optimized; it is scheduled in for all cases.
    - Will help with low load turndown; also helps us manage peaks in terms of utilizing pumped hydro units which can help keep costs down
    - If pumped hydro is pulled out of model, results in a more expensive solution; this proves that implementing pumped hydro is a system benefit
  - Not much being selected in Scenario 3 – low load growth
  - Scenario 8
    - Picking the floor of renewables portfolio; picking mid-level of EEDR
    - Combined cycle additions – associated with need for reliability
  - Modular reactors are not being modeled (not enough data on cost/construction time/etc. to model) – only one that is on the drawing board as of now which is a research reactor on the Clinch river to power Oak Ridge
- Gary showed graphics that illustrate capacity additions by fuel type for each level of idled coal-fired capacity
  - Dominated mostly by PPAs
  - Scenario 8 –starts picking up a small amount of purchased power then swaps out to a larger EEDR amount
- Also showed graphs that illustrate energy mix by fuel types for each level of coal-fired idling levels
- Moved onto plan cost – very PRELIMINARY results; have not completed the analysis on all the financial metrics (finishing the assessment of short term rates and risk metrics)
  - Showed tornado diagram of PVRR of the three Scenarios (1, 3, 8) – shows the spread of cost of the plans within the recommended planning strategy
  - Scenario 1 – plan costs are most expensive (b/c scenario 1 adds the most)
  - Scenario 8 – bars are almost the same length in all 4 cases (4 layup portfolios)
  - Takeaway: plan costs are relatively close together
- A slide was shown of what the IRP "is" and what it "isn't." This defines the line for where IRP coverage applies and what the next steps will be (such as more evaluation for adding additional capacity, etc.)
  - Committing to initiate the next IRP by 2015
  - Any additions like small modular nuclear reactors will require its own NEPA assessment
  - Keeping track of best practices, lessons learned, etc. for next IRP

<u>Questions and Comments from Stakeholders:</u>

- Look at ways to deal with impacts on transmission (EEDR) without adding new generation
- Is there a cost escalator on EEDR from the 3,600 MW to 5,000 MW case?
- Request to see the capital cost of the portfolios (schedule of implementing costs)
- Consider identifying research that needs to be done in between this IRP and next IRP.

VI. <u>Next Steps:</u>

- Next step for analysis – working to finalize sensitivity work and optimization work
- Financial analysis is still ongoing – after this is buttoned up, can begin to circulate results internally; will apply ranking metrics to see if we can identify the idling strategy that will be represented in the scorecard for the Recommended Planning Strategy

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- Once the scorecard is built for Recommended Planning Strategy, will compare to the scorecards from the draft to highlight improvement.
- Will reconvene with SRG on Jan. 26, 2011 – purpose will be to review analysis results
- Plan to meet again on Feb. 24, 2011 – purpose will be to review the final IRP (what will be presented to the Board)
- Transmitting final IRP to Environmental Protection Agency on March 3, 2011 (there is a required 30-day waiting period); ultimate Board decision will be mid-April 2011.